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ABSTRACT

REXALL is a flexible program within the CODAP (Comprehensive Occupational Data Analysis Programs) system designed primarily for analyzing judges' task-factor ratings, and may be used for identifying divergent raters. Divergent raters are those whose ratings are significantly different from the other raters' ratings. They may be the noncooperative raters who simply generate an arbitrary pattern of responses rather than try to follow the instructions, or they may invert the rating scale, or they may actually perceive the tasks differently. This report uses data from an actual study to show how REXALL is used to detect divergent raters, and to decide whether or not to delete them from the study since they may invalidate task means computed from ratings. It then uses the raw data from the study to verify the validity of the decisions made on the basis of the REXALL output. (Editor/WL)

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COMPREHENSIVE OCCUPATIONAL DATA ANALYSIS PROGRAMS (CODAP): USE OF REXALL TO IDENTIFY DIVERGENT RATERS

By

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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October 1976
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Chief, Occupation and Manpower Research Division

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REXALL is a very powerful and flexible program within the CODAP (Comprehensive Occupational Data Analysis Programs) system. It was designed primarily for analysing judges' task-factor ratings, and may be used for identifying divergent raters. Divergent raters are those whose ratings are significantly different from the other raters' ratings. They may be the non-cooperative raters who simply generate an arbitrary pattern of responses rather than try to follow the instructions, or they may invert the rating scale or they may actually perceive the tasks differently. Some divergent raters must be eliminated from the study to preserve the validity of the task means computed from the ratings. This report uses data from an actual study to show how REXALL is used to detect divergent raters, and to decide whether or not to delete them from the study. It then uses the raw data from the study to verify the validity of the decisions made on the basis of the REXALL output.

PREFACE

This research was accomplished under project 7734, Development of Methods for Describing, Evaluating, and Structuring Air Force Occupations; 77340116, Development and Modification of Comprehensive Occupational Data Analysis Programs (CODAP).

The author, an officer of the Royal Australian Air Force, is serving with the United States Air Force under the Exchange Program. Particular appreciation is expressed to Dr. Raymond E. Christal for his guidance and advice.

The views expressed in this report are not necessarily the official views of the United States Air Force or the Department of Defense.

TABLE OF CONTENTS

		Page
I.	Introduction	5
II.	General Discussion and Background	5
III.	Using the Rater Correlation Table to Identify Divergent Raters	8
IV.	Verification of Decisions by Reference to Raw Data	11
V.	Conclusion	12
References		12
Appendix A.	Instructions Used by Judges when Rating Tasks in Medical Services Specialist Inventory on Consequences of Inadequate Performance	13
Appendix B.	Raw Ratings for Three Typical "Good" Raters	14
Appendix C.	Raw Ratings for Six Non-Cooperative Raters	15
Appendix D.	Raw Ratings for Two Borderline Cases	17

LIST OF ILLUSTRATIONS

Figure		Page
1	9-point rating scale	5
2	REXALL inputs and outputs	6

LIST OF TABLES

Table		Page
1	Rater Correlation Table (In Original Input Order)	7
2	Rater Correlation Table (Re-ordered from High to Low Correlation)	9
3	Effects of Deleting Seven Divergent Raters	11
4	Rater Correlation Table Entries for Rater Number 61 with Tasks 72-505 Treated as Blank	12

COMPREHENSIVE OCCUPATIONAL DATA ANALYSIS PROGRAMS (CODAP): USE OF REXALL TO IDENTIFY DIVERGENT RATERS

I. INTRODUCTION

REXALL is a very powerful and flexible program within the Comprehensive Occupational Data Analysis Programs (CODAP) package, being designed primarily for analysing the inter-rater agreement among judges' task-factor ratings. One use of REXALL is for identifying divergent raters. After some general comments on REXALL, and a discussion of the term "divergent rater," this report uses data from an actual study to elaborate on this use of REXALL. The decisions made on the basis of the REXALL output will then be verified by reference to the raw data.

II. GENERAL DISCUSSION AND BACKGROUND

While REXALL was designed primarily for handling task factor ratings, it may be used for analysing and reporting data whenever a number of judges rate a set of items on some attribute. For example, it was applied when judges rated sets of officer job descriptions on various attributes (Christal, 1975), and when a sample of officers rated a set of education profiles on educational suitability for service in a particular utilization field (Watson & Goody, 1975). It may be applied to rankings as well as to ratings.

The items rated in the study used in this report were the 505 tasks in the task inventory for the Medical Service Specialist. A total of 93 first line supervisors rated the tasks on "Consequences of Inadequate Performance." The instructions page from the survey booklet is presented as Appendix A. It contains a definition of the task-factor involved, and describes the 9-point scale against which the judges were to make their ratings. The 9-point scale also appears as Figure 1. These ratings were gathered in order to obtain a measure, the mean rating, of Consequences of Inadequate Performance for each task. REXALL was used to determine whether any of the raters should be deleted from the study; and then to produce a card deck containing the mean task ratings, and to provide a measure of the inter-rater agreement on the ratings.

1. Minimal
2. Slight
3. Not very serious
4. Fairly serious
5. Serious
6. Very serious
7. Extremely serious
8. Almost disastrous
9. Disastrous

Figure 1. **9-point rating scale.**

A general description of REXALL and its relation to other CODAP programs has been documented by Christal and Weissmuller (1976). Figure 2 is a schematic presentation of the inputs to and outputs from the program. The outputs describing the items (tasks) that are rated are self-explanatory from Figure 2. Both outputs describing the raters were illustrated by Christal and Weissmuller (1976). The Inter-rater Reliability Table includes indexes of inter-rater reliability computed by the intraclass correlation formulas reported by Lindquist (1953). The Rater Correlation Table (Example, Table 1) is the tool for detecting divergent raters and will be treated in detail later in this report.

Before discussing Table 1 in detail, the term "divergent rater" needs clarification. This is simply a rater whose ratings are substantially different from those of the other raters. The most common of these are the non-cooperative raters who do not even try to follow the instructions, generating instead some arbitrary pattern of responses. Another type of divergent rater inverts the rating scale—instead of rating from low to

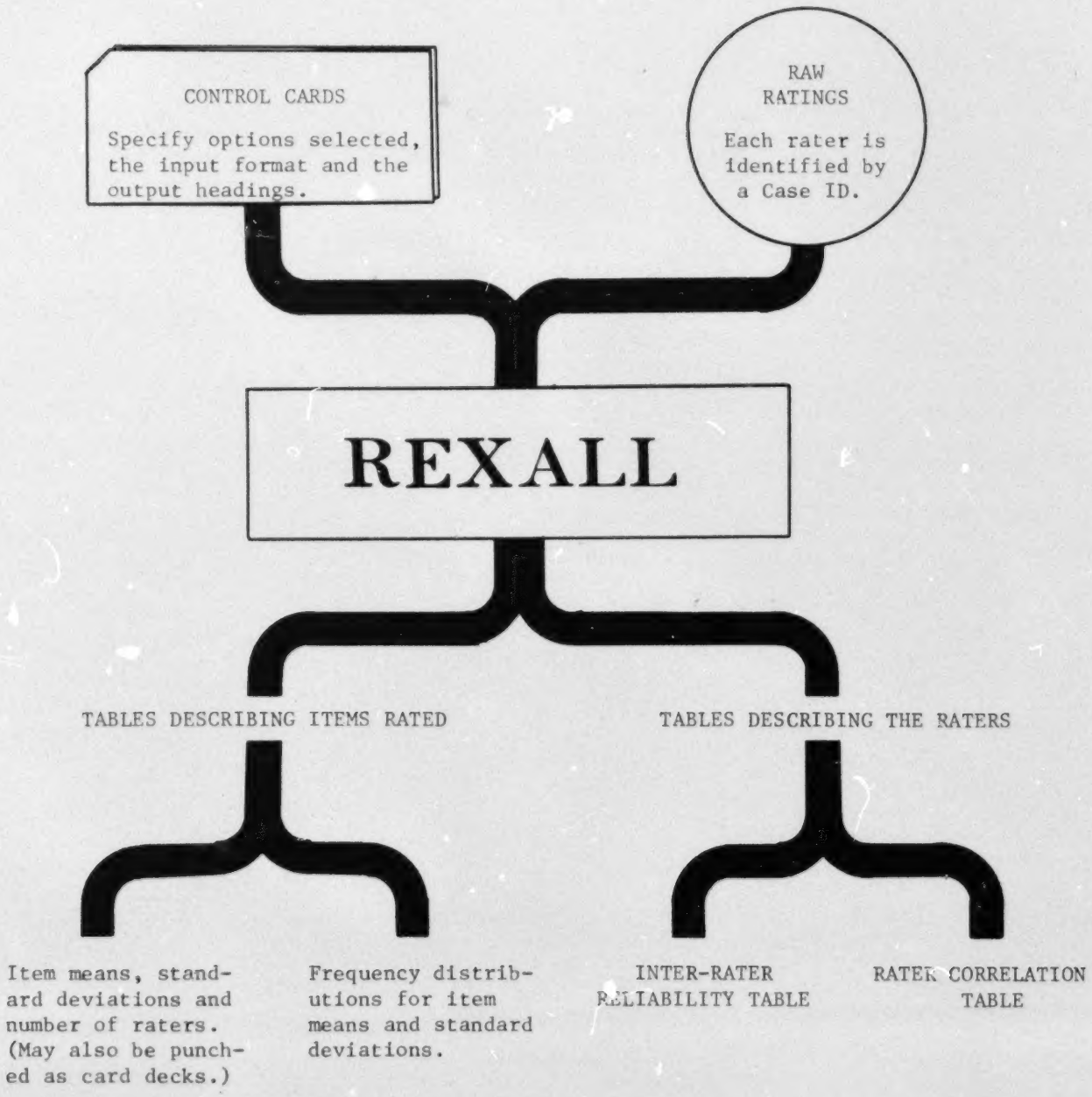

CONTROL CARDS
Specify options selected, the input format and the output headings.
RAW RATINGS
Each rater is identified by a Case ID.
REXALL
TABLES DESCRIBING ITEMS RATED
TABLES DESCRIBING THE RATERS
Item means, standard deviations and number of raters. (May also be punched as card decks.)
Frequency distributions for item means and standard deviations.
INTER-RATER RELIABILITY TABLE
RATER CORRELATION TABLE

Figure 2. **REXALL inputs and outputs.**

Table 1. **Rater Correlation Table (In Original Input Order)**

Rater ID	Correlation	N Ratings	Mean	SD	Sample Mean	T-Value
01	.670	505	3.92	1.00	5.12	20.22
02	.617	446	5.52	1.93	5.12	16.53
03	.690	504	5.10	1.13	5.12	21.35
04	.654	484	7.05	1.19	5.11	18.98
05	.486	503	4.21	.98	5.12	12.45
06	.589	504	7.54	1.47	5.12	16.34
07	.667	505	5.62	1.61	5.12	20.05
08	.664	505	5.00	1.11	5.12	19.91
09	.703	505	5.13	1.62	5.12	22.18
10	.737	505	5.10	2.36	5.12	24.47
11	.680	502	4.83	1.33	5.12	20.74
12	.612	504	6.35	1.35	5.12	17.35
13	.648	505	5.18	1.26	5.12	19.10
14	.662	496	5.83	3.12	5.12	19.64
15	.733	503	4.29	1.58	5.12	24.11
16	.152	505	6.03	1.85	5.12	3.45
17	.561	504	5.20	2.17	5.12	15.19
18	.727	504	5.18	1.84	5.12	23.75
19	.544	505	5.10	1.68	5.12	14.53
20	.681	504	5.94	1.56	5.12	20.86
•	•	•	•	•	•	•
•	•	•	•	•	•	•
•	•	•	•	•	•	•
74	.496	503	5.88	1.34	5.12	12.80
75	.547	505	6.52	1.60	5.12	14.66
76	.511	480	4.64	1.25	5.16	12.99
77	.474	503	5.41	1.01	5.12	12.05
78	.704	505	4.92	1.00	5.12	22.24
79	.553	500	6.29	2.06	5.13	14.81
80	.707	501	6.14	1.11	5.11	22.32
81	.480	502	8.21	1.74	5.12	12.23
82	.727	504	5.92	1.70	5.12	23.75
83	.523	150	1.99	2.00	4.66	7.47
84	.474	95	4.71	.71	4.87	5.19
85	-.115	505	1.02	.15	5.12	- 2.61
86	.567	294	2.61	1.66	5.19	11.77
87	.000	505	9.00	.00	5.12	.00
88	.083	96	6.77	1.39	4.56	.81
89	.708	505	6.72	2.06	5.12	22.50
90	.705	503	4.73	.89	5.12	22.25
91	.518	503	4.50	.64	5.12	13.55
92	.562	504	3.87	.69	5.12	15.24
93	.554	496	3.10	1.08	5.12	14.80

high the rater rates from high to low. As will be demonstrated shortly, both types are easily identified from REXALL's Rater Correlation Table. The non-cooperative rater is usually dropped from the study, and inverted ratings can be arithmetically reversed or dropped from the study at the option of the researcher. Yet another type of divergent rater is not so clear cut. This is the rater whose perception of the items being rated is different from that of the other raters. This difference in perception may be very real or may in effect be a lack of discrimination power or of knowledge on the part of the rater. In any case, the decision on whether or not to retain such a rater in the study is rather subjective and each case must be judged on its merits.

III. USING THE RATER CORRELATION TABLE TO IDENTIFY DIVERGENT RATERS

The Rater Correlation Table produced by REXALL contains a row of data for each rater, printed in the same order in which the cases were input to the program. Table 1 is an extract from the table for the illustrative study being used in this report, raters 21 through 73 being omitted because of space limitations. The correlation column contains the correlations between each rater's ratings and the means for all raters on the same tasks, the extreme right-hand column being a "T Value" for determining the level of significance of deviation of this correlation coefficient from zero. The other four columns are the number of items (tasks) rated by each rater, the rater's mean and standard deviation and the "sample mean." The sample mean is the mean of all raters' ratings on the tasks rated by that rater.

It is this table that is used to decide which raters are divergent and whether or not they should be deleted from the study. The following paragraphs describe how these decisions were established in the study being used to illustrate this report. For ease of explanation, the table entries containing the 20 highest and the 20 lowest correlations have been extracted from the original table and are presented as Table 2. When the program is next revised, it is planned to provide an option to repeat Table 1, rearranged in descending order of correlation coefficient, and also on other variables contained in it.

From Table 2 it is evident that the majority of the correlation coefficients exceed .50 (in fact, 77% exceed .50). Even the "good" raters vary in number of tasks rated and in mean and standard deviation of ratings. However, their high correlations with the group indicate that they share similar perceptions of the relative consequences of inadequate performance of the tasks in the inventory.

The prime indicators of divergent raters are the correlation coefficients. A high negative coefficient indicates inverted ratings, while an insignificant coefficient is the result of a non-cooperative rater. The raters who have made a genuine attempt to obey the instructions, but whose perceptions of the tasks differ from those of the majority of the raters, should have a relatively low, but significant, correlation coefficient. Unfortunately, this condition may also typify the rater who cooperates for part of the inventory and then becomes non-cooperative.

Table 2 will now be used to identify the divergent raters in this study. There does not appear to be any cases of inverted ratings. The last six raters (in Table 2) are apparently non-cooperative raters, and at least the next two require special consideration as their perceptions of the tasks seem to be different from those of the majority of the raters. Each of the last eight raters in Table 2 will now be discussed individually.

Rater 85. The correlation coefficient (−.115) could, in isolation, suggest inverted ratings but the other data available suggests otherwise. All tasks were rated. The rater's mean of 1.02 and standard deviation of .15 suggest that almost every task has been rated 1, with only a few higher ratings. Probably by chance, these higher ratings were allocated to lower than average tasks, giving rise to the negative correlation coefficient. Rater 85 appears to have been non-cooperative and was deleted from the study.

Rater 41. A mean of 1.33 (standard deviation .81) indicates most tasks were rated 1 with a sprinkling of higher ratings, perhaps just to break up the pattern. Rater 41 seems to be another non-cooperative rater and was also dropped from the study.

Rater 87. The mean of 9.00 with a zero standard deviation indicates this rater rated every task 9. This is perhaps the most obvious type of lack of cooperation. Rater 87 was deleted.

Table 2. **Rater Correlation Table (Re-ordered from High to Low Correlation)**

Rater ID	Correlation	N Ratings	Mean	SD	Sample Mean	T-Value
67	.764	505	5.07	1.43	5.12	26.54
10	.737	505	5.10	2.36	5.12	24.47
15	.733	503	4.29	1.58	5.12	24.11
82	.727	504	5.92	1.70	5.12	23.75
18	.727	504	5.18	1.84	5.12	23.75
35	.726	503	4.49	1.44	5.12	23.66
44	.720	503	4.81	1.52	5.12	23.23
65	.720	494	4.19	1.07	5.12	23.00
89	.708	505	6.72	2.06	5.12	22.50
80	.707	501	6.14	1.11	5.11	22.32
90	.705	503	4.73	.89	5.12	22.25
78	.704	505	4.92	1.00	5.12	22.24
09	.703	505	5.13	1.62	5.12	22.18
21	.703	502	4.86	1.29	5.12	22.10
60	.699	479	4.41	1.40	5.14	21.35
72	.695	505	4.04	.84	5.12	21.69
34	.694	503	4.75	1.13	5.11	21.60
03	.690	504	5.10	1.13	5.12	21.35
64	.689	375	4.72	2.31	5.23	18.34
53	.687	505	6.13	1.70	5.12	21.18
•	•	•	•	•	•	•
•	•	•	•	•	•	•
•	•	•	•	•	•	•
74	.496	503	5.88	1.34	5.12	12.80
05	.486	503	4.21	.98	5.12	12.45
81	.480	502	8.21	1.74	5.12	12.23
77	.474	503	5.41	1.01	5.12	12.05
84	.474	95	4.71	.71	4.87	5.19
31	.454	479	8.44	1.14	5.14	11.12
27	.439	504	5.50	2.06	5.12	10.96
24	.396	502	3.62	1.25	5.12	9.64
52	.377	505	2.41	2.48	5.12	9.12
48	.358	505	4.98	.94	5.12	8.60
68	.327	505	3.93	.51	5.12	7.76
63	.245	384	3.02	2.64	5.09	4.94
54	.194	504	7.79	2.03	5.12	4.44
16	.152	505	6.03	1.85	5.12	3.45
61	.106	505	5.14	.96	5.12	2.38
88	.083	96	6.77	1.39	4.56	.81
22	.047	505	2.69	2.09	5.12	1.07
87	.000	505	9.00	.00	5.12	.00
41	-.012	505	1.33	.81	5.12	- .26
85	-.115	505	1.02	.15	5.12	- 2.61

Rater 22. This combination of very low correlation (.047), low mean (2.69) and high standard deviation (2.09), when the rater has responded to every task, suggests a propensity of 1 or 2 ratings, with a number of higher ratings (some up near the top of the scale) allocated indiscriminately among the other tasks. Rater 22 was treated as a non-cooperative rater and deleted.

Rater 88. This rater responded to only 19% of the tasks. Although this 19% of the tasks tended to be less demanding than average (sample mean = 4.56; overall mean = 5.12), this rater averaged 6.77 on them. The ratings that were provided are therefore very high, and a correlation of .083 suggests they are not very realistic. The insigificant correlation and low number of tasks rated justify deleting this rater on the grounds of lack of cooperation.

Rater 61. This case approaches the doubtful zone. The correlation is too low to believe the rater has been entirely cooperative; and it is too low to assume a simple difference in perception of the tasks. Rater 61 was dropped from the study as being non-cooperative.

Rater 16. Apart from the relatively low correlation coefficient, this rater's statistics seem fairly normal, except that the mean is perhaps a little high. There seem to be three possibilities: there is either a genuine difference in perception, or a lack of discrimination power, or a lack of complete cooperation. A clear decision cannot be made on the data available. As there are plenty of raters, and this one represents an isolated opinion if the ratings are genuine, the analyst chose to drop him from the study even though retention would not have seriously affected the task means and the inter-rater reliability statistics.

Rater 54. The analysis for this rater is very parallel to that for Rater 16. However, the very high mean (7.79) and standard deviation (2.03) indicates a very large number of 9 ratings, perhaps genuinely believed to be justified. This rating pattern has depleted the rater's discrimination power at the high end of the scale and thus caused the relatively low correlation coefficient. The decision on whether or not to delete this rater should have little effect on the objectives of the study. While an equally good case could be made for deletion, the analyst chose to retain this rater in the study.

The next six to ten raters above Rater 54 in Table 2 also have appreciably lower correlations than the majority of raters and could be classed as divergent raters. However, their ratings are considered genuine and the lower correlations can usually be explained. For example, the analysis for Rater 81 would parallel that for Rater 54; Raters 63 and 52 are the same except that by favoring the low end of the scale they have depleted their discrimination at that end of the scale. Raters 68, 48, and 84 demonstrate their low discrimination power by their lack of variation in ratings. As implied by the analysis for Rater 54, more than seven raters could have been deleted without significantly affecting the objectives of the study either way. Where to "draw the line" must remain, for the time being, a subjective decision on the part of the analyst. One more objective approach being examined is to have the program progressively eliminate the most divergent raters, one at a time, until the inter-rater reliability statistic for the stability of the item (task) means (R_{kk}) ceases to increase.

At this point, one further comment on divergent raters should be made. As is seen from Tables 1 and 2, there are considerable differences among the raters' means and among their standard deviations, caused by different perceptions of the words used to describe the levels on the 9-point rating scale. However, the magnitude of the correlations for the cases retained in the study are satisfactory evidence that these raters shared sufficiently similar perceptions of the relative consequences of inadequate performance of the tasks in the inventory. As it is a measure of the relative consequences that is required, no rater was declared divergent on the grounds of a high or low mean. In fact, these differences in means and standard deviations only add within task variance that is not justified when relative measures are being sought. Accordingly the standardization option discussed by Christal and Weissmuller ('1976) was used in this study to remove the between rater variance.

The effects of deleting the seven divergent raters is presented in Table 3. Deleting the divergent raters, the ones who did not cooperate and those who perceived the relative values of the tasks differently, does appreciably increase the inter-rater reliability and therefore increases the stability of the task means. This applies whether or not the data are standardized.

Table 3. **Effects of Deleting Seven Divergent Raters**

	N	R_{11}	R_{kk}
Raw ratings, 0 deletions	93	.151	.941
Raw ratings, 7 deletions	86	.195	.952
Standardized ratings, 0 deletions	93	.313	.976
Standardized ratings, 7 deletions	86	.355	.979

IV. VERIFICATION OF DECISIONS BY REFERENCE TO RAW DATA

Having made the above decisions based on the REXALL output, a copy of the raw data for each rater was obtained to examine their validity. Extracts of the raw ratings are presented in Appendixes B, C and D as blocks of raw ratings, each block containing all the ratings made by one rater. Each block contains eight rows of digits, 69 digits in each of the first seven rows and 22 in the last row. This is a total of 505 digits, one for each task in the inventory. Each digit is a task rating by the rater to which the block refers, a 0 indicating the rater did not rate the task. The first digit on the first row is the rating for Task 1, the last on that row is Task 69, and so on, the last digit on the last row being the rating on Task 505.

Appendix B is the ratings for three "good" raters, provided for comparison purposes. It would appear that the raters have considered and rated each task individually. This does not mean, of course, that their ratings are identical. Because of differences in experience, work location, etc., there will be some differences in perception, and of course there will always be some error variance.

In contrast with Appendix B, Appendix C is the raw ratings for the six raters assessed as being non-cooperative. Each will now be discussed in turn, reflecting on the diagnoses previously made from Table 2 (the REXALL output).

Rater 85. As predicted, Rater 85 rated nearly every task 1. The seven 2 ratings and one 3 rating were all allocated to tasks which most raters considered less consequential than average. For example, the one task that was rated 3 was "schedule leaves or passes." This is hardly as consequential as, for example, tasks involving rendering emergency treatment to a patient, which were obviously rated lower by Rater 85.

Rater 41. The prediction was that most of this rater's ratings would be 1 with a sprinkling of higher ratings. Notice the three 9 ratings. These three tasks were: (a) plan records maintenance, (b) direct physical exercise or conditioning programs, and (c) direct preparation and maintenance of records or reports. Considering the number of tasks in the inventory that could result in the immediate death of a patient, it is evident this rater was non-cooperative. Perhaps he was trying to exercise his sense of humor.

Rater 87. Every task was rated 9 as anticipated.

Rater 22. A propensity of 1 and 2 ratings was predicted, with some high ratings allocated indiscriminately. This diagnosis is confirmed. The indiscriminate nature of the high responses can be illustrated by considering two tasks from the aeromedical evacuation duty: (a) 432. make up litters, and (b) 434. operate inflight emergency oxygen systems. The mean overall ratings on these two tasks were 3.56 and 6.30, respectively, but this rater rated the first task "almost disastrous" (an 8) and the second as "minimal" (a 1). It is probable that the highly rated tasks are those with which the rater is directly involved. Rater 22 did not comply with the instructions.

Rater 88. The raw ratings confirm the analysis from the data in Table 2. A faint-hearted attempt seems to have been made at the early tasks and the rater has left the rest of the booklet blank. This pattern is fairly common among non-cooperative raters who seem to believe no one will ever detect their lack of cooperation if the survey booklet appears to have been honestly completed.

Rater 61. The pattern of this rater's raw responses explains his low correlation. The ratings for the first 71 tasks are very consistent with those of the group. However, at that point the rater has become non-cooperative and rated all but one of the remaining tasks 5. To examine how good this rater's first 71 responses were, the table entries that would have resulted had tasks 72 through 505 not been rated at all, were computed. They appear as Table 4. These statistics are quite acceptable. It would have been far better if Rater 61 had left these remaining tasks blank.

Table 4. **Rater Correlation Table Entries for Rater Number 61 with Tasks 72-505 Treated as Blank**

Correlation	=	.637
N Ratings	=	71
Mean	=	6.03
Standard Deviation	=	2.34
Sample Mean	=	4.51
T-Value	=	6.87

The raw data for the two borderline cases (Raters 16 and 54) are presented in Appendix D. As suggested in the earlier analysis, their ratings should appear fairly normal unless they were partially cooperative raters (like Rater 61). Except for the abnormally large number of high ratings, particularly for Rater 54, both rating patterns seem reasonable. As already mentioned, the decision on whether to accept or reject these two raters is rather subjective, either course having little effect on the mean ratings of the tasks. Rater 54 has given more valid ratings than Rater 16, although they are far from perfect. There seems to be no reason to change the previous decision which was to accept one and reject the other.

V. CONCLUSION

All the decisions regarding divergent raters in this study, made on the basis of REXALL's Rater Correlation Table, have been verified by reference to the raw data. There were no cases of inverted ratings in this study, although arithmetical inversion of such ratings in another study conducted by the author did testify to the validity of treating high negative correlations as indicators of scale reversal. The interpretation of relatively low, but significant, correlation coefficients must remain somewhat subjective for the time being. More objective approaches to the handling of such cases are currently under consideration by the Air Force Human Resources Laboratory.

REFERENCES

Christal, R.E. *Systematic method for establishing officer grade requirements based upon job demands.* AFHRL-TR-75-36, AD-A015 756. Lackland AFB, TX: Occupational and Manpower Research Division, Air Force Human Resources Laboratory, July 1975.

Christal, R.E., & Weissmuller, J.J. *New CODAP programs for analyzing task factor information.* AFHRL-TR-76-3, AD-A026 121. Lackland AFB, TX: Occupational and Manpower Research Division, Air Force Human Resources Laboratory, May 1976.

Lindquist, E.G. *Design and analysis of experiments in psychology and education.* Boston: Houghton Mifflin, 1953, 359–361.

Watson, W.J., & Goody, K. *Matching job education requirements with candidates' educational attainments – A pilot methodological study.* AFHRL-TR-75-79, AD-A025 214. Lackland AFB, TX: Occupational and Manpower Research Division, Air Force Human Resources Laboratory, December 1975.

APPENDIX A. INSTRUCTIONS USED BY JUDGES WHEN RATING TASKS IN MEDICAL SERVICES SPECIALIST INVENTORY ON CONSEQUENCES OF INADEQUATE PERFORMANCE

Explanation

This booklet contains a listing of tasks performed in your career ladder. You are asked to rate each task to indicate the Probable Consequences of Inadequate Performance of the task. In the Air Force, the consequences of inadequate performance of some tasks are much more serious than for other tasks. For example, if inadequate performance of a task will almost certainly cause an aircraft to crash, or a warehouse to burn down, or an airman to die, this would be more serious than inadequate performance of a task which merely causes inconvenience and irritation. As another example, the probable consequences of inadequate performance in responding to a fire alarm would be much more serious than the probable consequences of inadequate performance in folding hospital linen.

Definition

Consequences of Inadequate Performance is a measure of the seriousness of the probable consequences of inadequate performance of a task. It is measured in terms of possible injury or death, wasted supplies, damaged equipment, wasted man-hours of work, etc.

Your Task

Using the rating scale below, assign a numerical rating to each task in this booklet which you feel describes the probable consequences of inadequate performance of the task. Make your ratings by simply writing a number 1 through 9 in the column to the right of each task. Please attempt to rate all tasks.

Rating Scale

If the task is <u>not</u> done correctly, the probable consequences of inadequate performance would be:

1. Minimal (inadequate performance has minimal consequences)
2. Slight
3. Not very serious
4. Fairly serious
5. Serious
6. Very serious
7. Extremely serious
8. Almost disastrous
9. Disastrous (inadequate performance has disastrous consequences)

Your efforts in completing this booklet will be sincerely appreciated. When you have finished your ratings, please return this booklet to your CBPO/DPMPC.

APPENDIX B. RAW RATINGS FOR THREE TYPICAL "GOOD" RATERS

Rater Number 15

411322213034542434332432332234232224333332322444331433433533424333344333433433533433323343433333223333332433343334434333333353333432224263434433466645543333354544666653333332366345555555553656655455346677777337776455344444455656554456677566555555556655554553343334333443547554436548555677944456654444333954654539465554343357754444444443334444343223443343332263344232234669777577525456569845945497496669064635554544333453334733647554754334437666345555533333354769766455944556655965577545556644993568

Rater Number 44

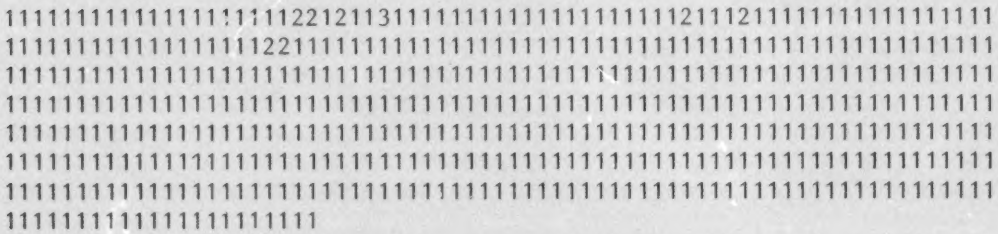
212455534543551445004332455224141544455211333355641144535351253545515435554555353555555333233333222213553452433353344566333333333663633433375556544577748446443675664567836656663445755544655575854453553335556575834555654443334564665345446656544666657545677774665533555656566575244763336646565676754356575765443854544568468854453376665635666552265665355444466555533454455454446767555466455555567858845457877368344345465554555556355653565565455554564766675555737777777586777556786655588595556785555775799335 7

Rater Number 53

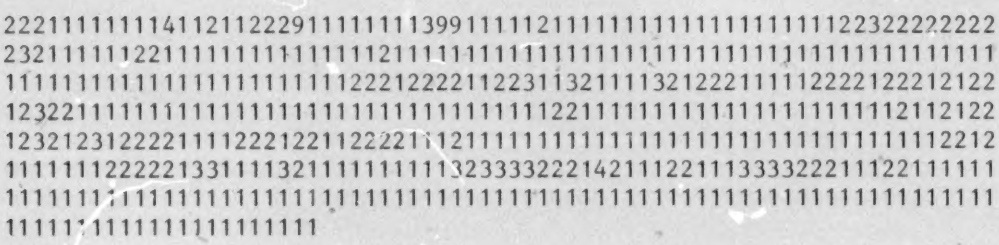
323132422543543437413472346345256355454433433244731644556573573636644555654755652744635544556844544564777462866666655476555465555567555544658666766668996855855566588589999367555546895577669769555555535565566877999578898557676688788887888898888777888787888877777887866677787777766697777588586678887778566658885559756778795787877656887677877777458777777885556777767527752585633468889885665666878898788877897888897766787877566677637788378887768685778586665765585766787878597568559587788779775895453447777785577

APPENDIX C. RAW RATINGS FOR SIX NON-COOPERATIVE RATERS

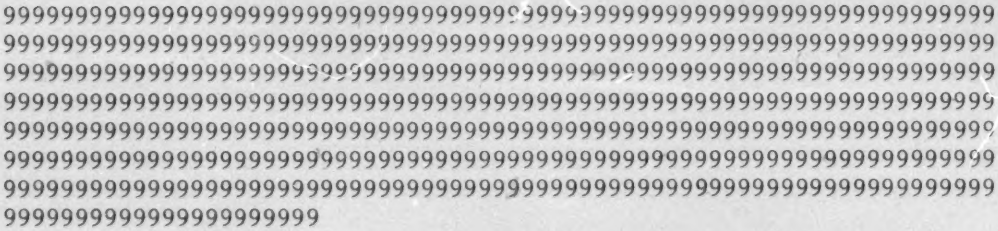
Rater Number 85



Rater Number 41



Rater Number 87



Rater Number 22

41527522147197187111225117216113122732611162421111115666658447574832454447755747584447744756624222222557264264642122621242111246111111314211171755555522122211111131121152455725227151117112211211311211611111111211152433312243425352213111344421424425552311111175415251121151411112255555225741113554122115722232221912444211521111911186117171814115151111111111131124551116111111111121666226661711466471111111111811111111111111111311121111111121112111131111181122111111112441111111151111

Rater Number 88

65675556667655666787767915556567987675556667897779989898888998777676798678977778889777666650556700009070000000000

APPENDIX D. RAW RATINGS FOR TWO BORDERLINE CASES

Rater Number 16

75788455697898497766887477866646788675544467787786477686887678587897
87688778786898777867886587899989798899797778888989999989999989999999
99998999989899998798889989889899889888877789777779888888775857756657 7
78989456687778654456546563354447566547665586866887764445465455755476 3
53746532672733645545465646466765377556455957886645448875457445645 6
66755744557455544345435535333464677755645567474575553346447555744333 4
54444346454434434434434546464546434453554544344555445556456546375455 4
473624563455433456 3455

Rater Number 54

94779556999699588977799798979958885999989597789898877998899798799999
95599988999988979997699978955141555799579999998799945559998669999949 8
99122299666999999999966909999999979999999999999999999999999999999799999
99999999999999999999222559299999999997795777777999777777799799997779
99999555999999999997999999997599999999999979999999959998959999999959999
99577777999799997559989652529989999979999992999999595559599175932599 45
99999999777919599599599999999994959999799999999998977299999021229 1
56772249222999279992 98

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